CONTINUOUS GLUCOSE MONITORING [CGM] IN CKD

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CKD AND GLUCOSE LEVELS

- CKD patients face a unique "double burden" of severe hypoglycemia and profound hyperglycemia.
- Decreased renal gluconeogenesis leads to fasting hypoglycemia risk.
- Reduced insulin clearance (higher levels) and increased insulin resistance alters glucose levels.

- Uremia impairs peripheral glucose uptake and promotes insulin resistance.

- HbA1c unreliable marker in CKD : - Altered RBC lifespan (shorter), Erythropoietin (ESA) therapy, and blood transfusions , iron deficiency and protein carbamylation (urea interference).

- Hypoglycemia common: Blunted glucagon and epinephrine responses to low sugar , poor glycogen stores and protein-energy wasting in advanced CKD , reduced clearance of insulin and sulfonylureas.

Glycemic Markers Comparison

Metric	Standardization	Accuracy in CKD	Utility
HbA1c	Gold Standard	Low (biased)	Long-term avg
GA / Fructosamine	Moderate	Moderate	Short-term (2-3 wks)
SMBG (Fingerstick)	N/A	High	Point-in-time only
CGM	Emerging	Comprehensive	Trends & Variability

CGM METRICS

Time in Range (TIR)

Target: 70–180 mg/dL. Aim for >50% in CKD.

Time Above Range (TAR)

Target: >180 mg/dL. Aim to minimize spikes.

Time Below Range (TBR)

Target: <70 mg/dL. Priority #1 is safety.

Glycemic Variability (CV)

Target: CV < 36%. Lower is better.

>50% TIR Goal : Primary clinical target for the high-risk patient population.

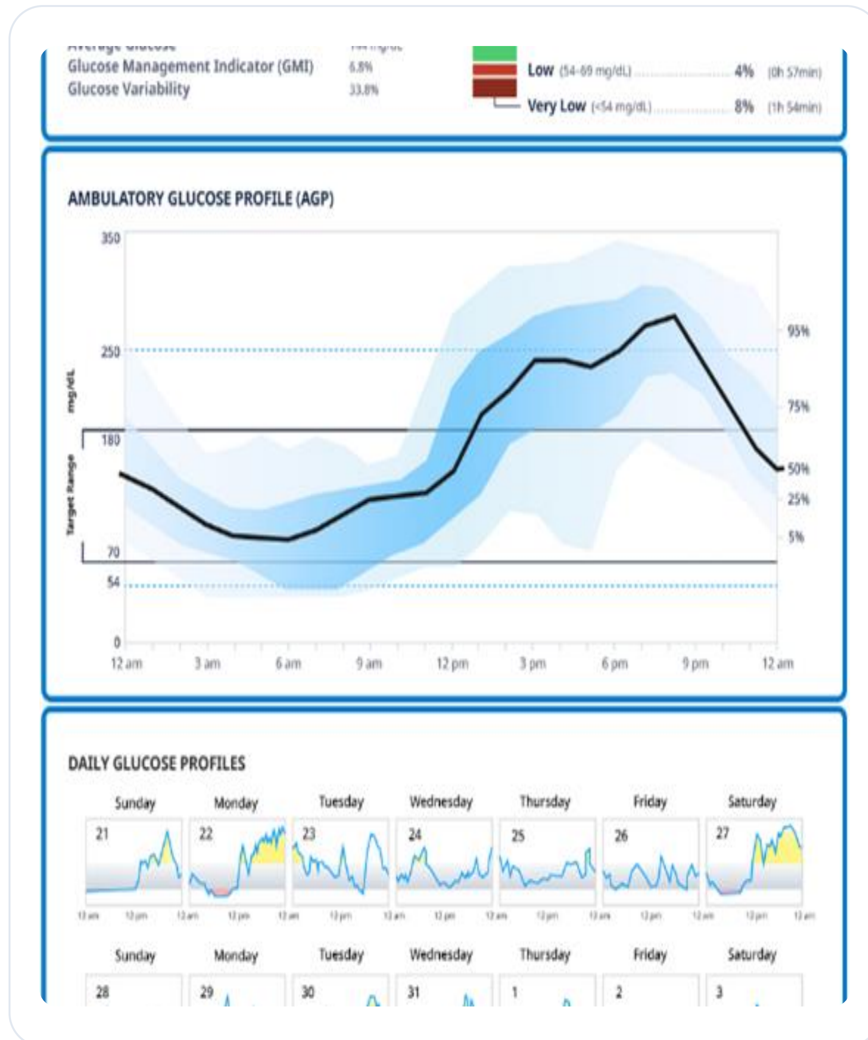
CLINICAL TARGETS IN CKD : -

Hypoglycemia (TBR) : Priority #1. Goal < 1% (<54 mg/dL).

Hyperglycemia (TAR) : Aim for < 50% of the day.

Glycemic Variability : CV < 36% (Lower is better).

AGP Pattern Recognition



Wide Bands

High intra-day variability. Suggests inconsistent glucose control throughout the 24-hour period.

Nocturnal Dips

Risk of "Silent" hypoglycemia (common in CKD). Monitoring overnight trends is critical for safety.

Post-Meal Spikes

Mismatch in insulin timing or carb intake. Reflects immediate glycemic response to dietary intake.

CGM – DIALYSIS / TRANSPLANT

- Dialysis patients have nadir low glucose at 3rd /4th hour and rebound hyperglycemia after the session and also dangerous hypoglycemia in the night on treatment.
- Recurrent hypoglycemia : QT prolongation and arrhythmias , cognitive decline /dementia and repeated hospitalizations.
- CGM helps detect intra-dialysis and inter- dialytic glucose variability and guide insulin treatment.
- In transplant patients CGM detects PTDM before HbA1C values reflect the change.
- It helps in timing OHA/Insulin doses as per glucose peaks following CNI and steroid dosing.